Chapter 4 – Comparable Intersections

Before and after operational data was not available at the Candlewood Drive/ Gary Avenue (CG) intersection. Other similar intersections were used to compare with the roundabout.

Section 4.1 – Dickens Avenue/ Wreath Avenue (DW)

The intersection of Dickens Avenue and Wreath Avenue (DW) is the junction of two collector roads. The adjacent land use consists of residential in both south quadrants, a regional park in the northwest quadrant, and a vocational school in the northeast quadrant.

Traffic volumes on the approach legs were found to be similar to that at the roundabout intersection. Typical traffic levels at this intersection are shown in Table 7. The approach volumes ranged from 1,354 to 2,770 on a daily basis. The intersection approach totals are shown graphed in Figure 8. During the AM and PM peak hours, the intersection carried 615 and 680 vehicles respectively. These traffic counts were collected on Tuesday, April 20, 1999.

Vehicle speed data was also collected on the approaches to this intersection. The approach speeds ranged from 35 to 51 kph (22 to 32 mph) (see Table 8).

The two roads are both two-lane with one lane in each direction. Parking is restricted near the intersection allowing creation of a turn lane on each approach. The north and south approaches have one left turn lane and a combined thru/ right lane. The east and west approaches have combined left/ thru lane and a separate right turn lane. The east and west approaches are STOP sign controlled while the north and south are not controlled.

While the west approach road drops away from the intersection, the intersection and approach are essentially level.

Table 7 - Dickens Avenue/ Wreath Avenue Appraoch Traffic Counts

	Direction From Intersection				
End Time	N	S	E	W	Hour Total
0100	8	6	4	9	27
0200	9	7	7	4	27
0300	10	5	5	2	22
0400	1	7	2	4	14
0500	11	4	3	9	27
0600	29	6	7	15	57
0700	49	37	35	33	154
0800	**187**	**161**	**117**	**150**	**615**
0900	127	144	83	86	440
1000	145	116	63	58	382
1100	151	110	45	66	372
1200	209	141	93	107	550
1300	227	156	91	105	579
1400	191	157	87	93	528
1500	219	122	89	121	551
1600	225	131	104	115	575
1700	264	110	112	117	603
1800	**277**	**130**	**130**	**143**	**680**
1900	183	112	88	120	503
2000	78	93	53	75	299
2100	72	51	61	86	270
2200	55	43	41	45	184
2300	29	21	23	19	92
2400	14	14	11	9	48
Day Total:	2,770	1,884	1,354	1,591	**7,599**

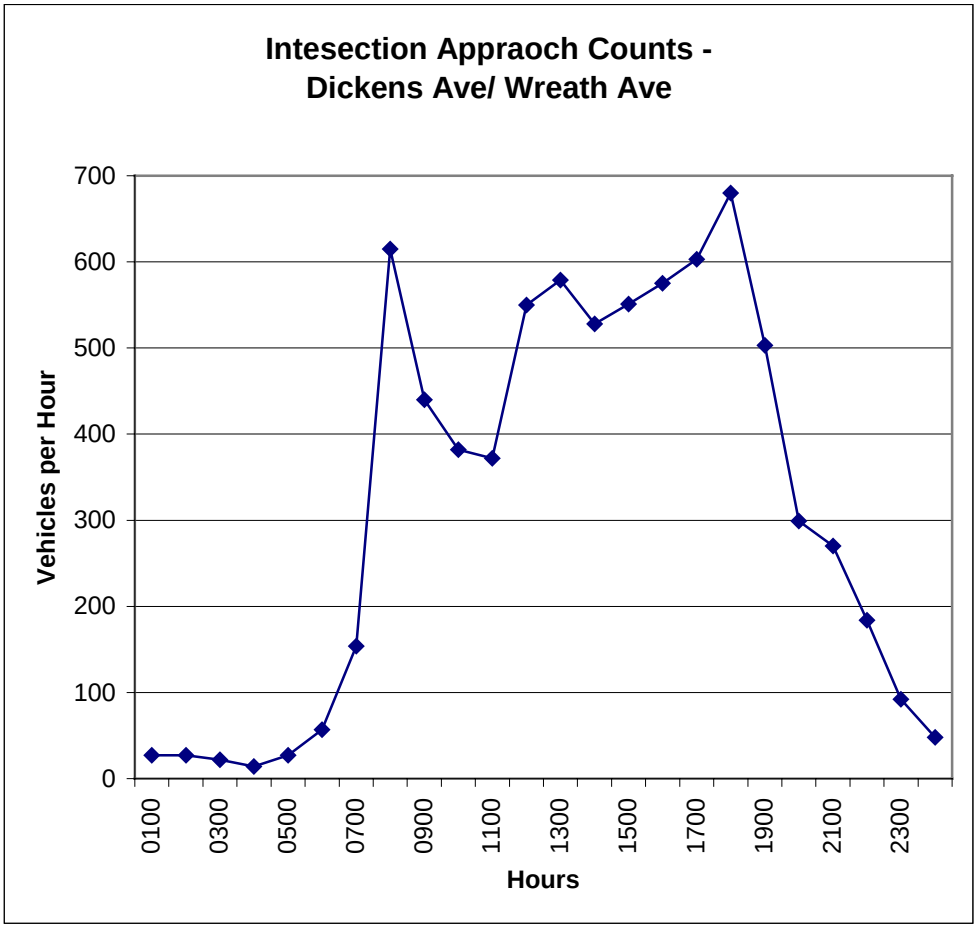

Figure 8 - Dickens Avenue/ Wreath Avenue – Total Approach Traffic Counts

Table 8 - Dickens Avenue/ Wreath Avenue 85 percentile Appraoch Speeds

Approach	North	South	East	West
85% Speed (kph)	41	36	52	49
(mph)	25	22	32	30

The 22 data traffic counts for the Dickens Avenue/ Wreath Avenue intersection are shown in Table 9. This table also shows the corresponding peak hour factor and the resulting maximum hourly flow. Initial statistical analysis looked at whether the data was normally distributed. The cumulative frequency histogram of the raw traffic counts in shown in Figure 9. The data in this figure appears to follow the standard normal curve shape for a normal distribution.

Table 9 - Dickens Avenue/ Wreath Avenue Traffic Count Data

Date:	Day of Week:	Count:	Peak Hour Factor:	Max Peak Hour:
5/7/99	Friday	215	0.53	406
4/22/99	Thursday	258	0.85	304
5/7/99	Friday	263	0.85	309
5/7/99	Friday	269	0.87	309
4/21/99	Wednesday	270	0.84	321
4/22/99	Thursday	291	0.84	346
5/4/99	Tuesday	293	0.94	312
5/6/99	Thursday	306	0.90	340
5/5/99	Wednesday	307	0.83	370
4/22/99	Thursday	310	0.91	341
4/21/99	Wednesday	310	0.86	360
5/3/99	Monday	323	0.49	659
5/6/99	Thursday	325	0.71	458
4/23/99	Friday	353	0.64	552
5/3/99	Monday	414	0.62	668
5/6/99	Thursday	415	0.86	483
4/22/99	Thursday	437	0.87	502
5/7/99	Friday	440	0.74	595
5/5/99	Wednesday	447	0.67	667
5/6/99	Thursday	466	0.71	656
4/22/99	Thursday	479	0.77	622
5/5/99	Wednesday	480	0.77	623
		340	**0.77**	**444**
Summary:				
	Max:	480	Range:	265
	Min:	215		

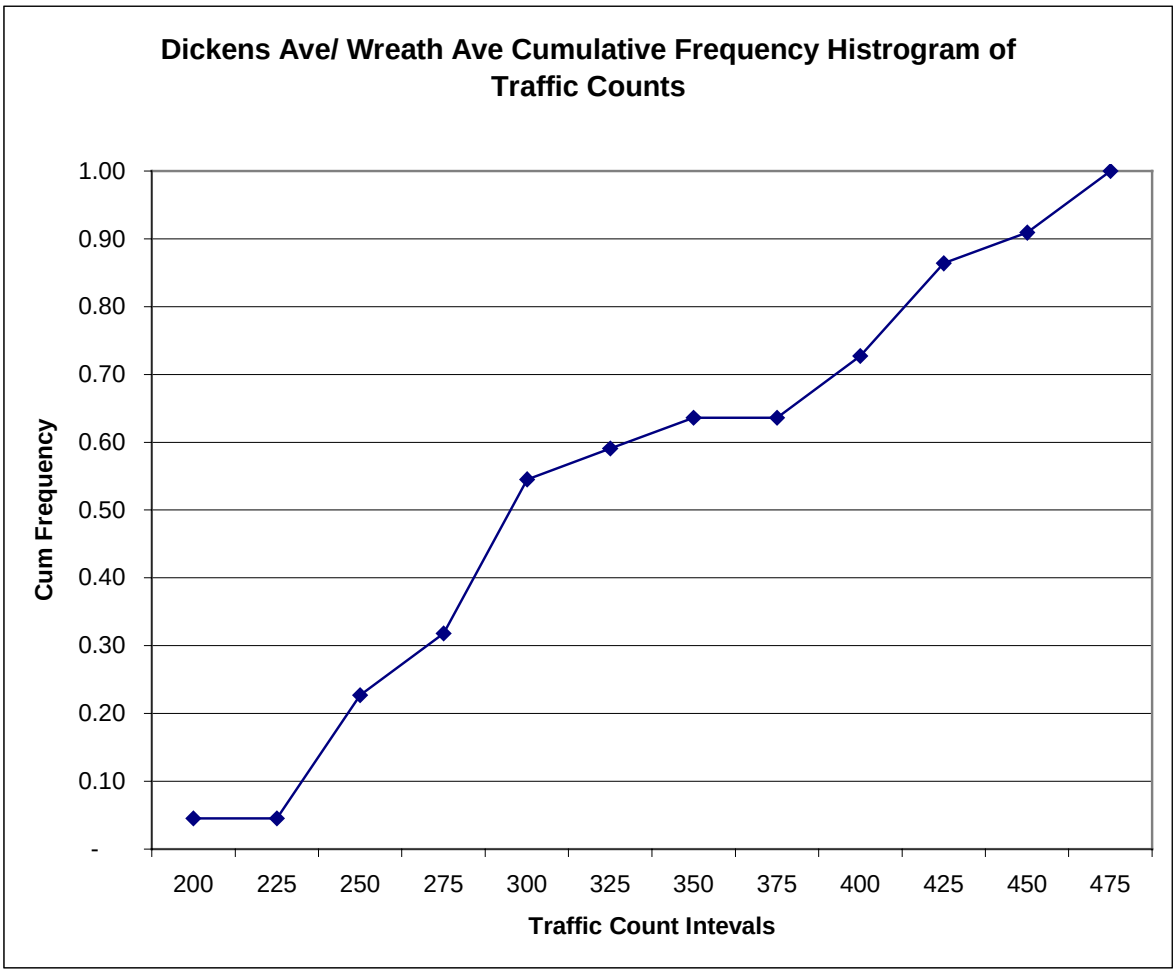

Figure 9 - Cumulative Frequency Distribution of Traffic Counts - DW

Section 4.2 – Juliette Avenue/ Pierre Street (JP)

The intersection of Juliette Avenue and Pierre Street (JP) is located south of the downtown in Manhattan, Kansas. Juliette Avenue is a north/ south collector road and Pierre Street is an east/ west local street. The adjacent neighborhood land use is primarily residential.

Traffic volumes on the approach legs were found to be as shown in Table 10. The daily approach volumes ranged from 1,106 to 3,660 vehicles. The intersection approach totals are shown graphed in Figure 10. During the AM and PM peak hours, the intersection carried 641 and 1,040 vehicles respectively. These traffic volumes were collected on Tuesday, May 11, 1999.

Vehicle speed data on the approaches to the intersection ranged from 54 to 62 kph (33 to 38 mph) (see Table 10).

Table 10 - Juliette Avenue/ Pierre Street Appraoch Traffic Counts

	Direction From Intersection				
End Time	N	S	E	W	Hour Total
0100	8	9	9	4	30
0200	9	8	3	5	25
0300	10	5	2	3	20
0400	1	2	2	1	6
0500	11	6	0	4	21
0600	29	11	4	14	58
0700	49	32	8	34	123
0800	**187**	**217**	**78**	**159**	**641**
0900	127	123	56	108	414
1000	145	86	45	54	330
1100	151	145	37	47	380
1200	209	239	72	110	630
1300	227	333	74	146	780
1400	219	179	42	79	519
1500	157	147	70	93	467
1600	119	131	89	160	499
1700	165	307	88	170	730
1800	**188**	**487**	**129**	**226**	**1030**
1900	207	364	107	171	849
2000	142	318	49	114	623
2100	132	263	53	121	569
2200	62	135	43	74	314
2300	43	82	27	28	180
2400	22	31	19	12	84
Day Total:	2,619	3,660	1,106	1,937	**9,322**

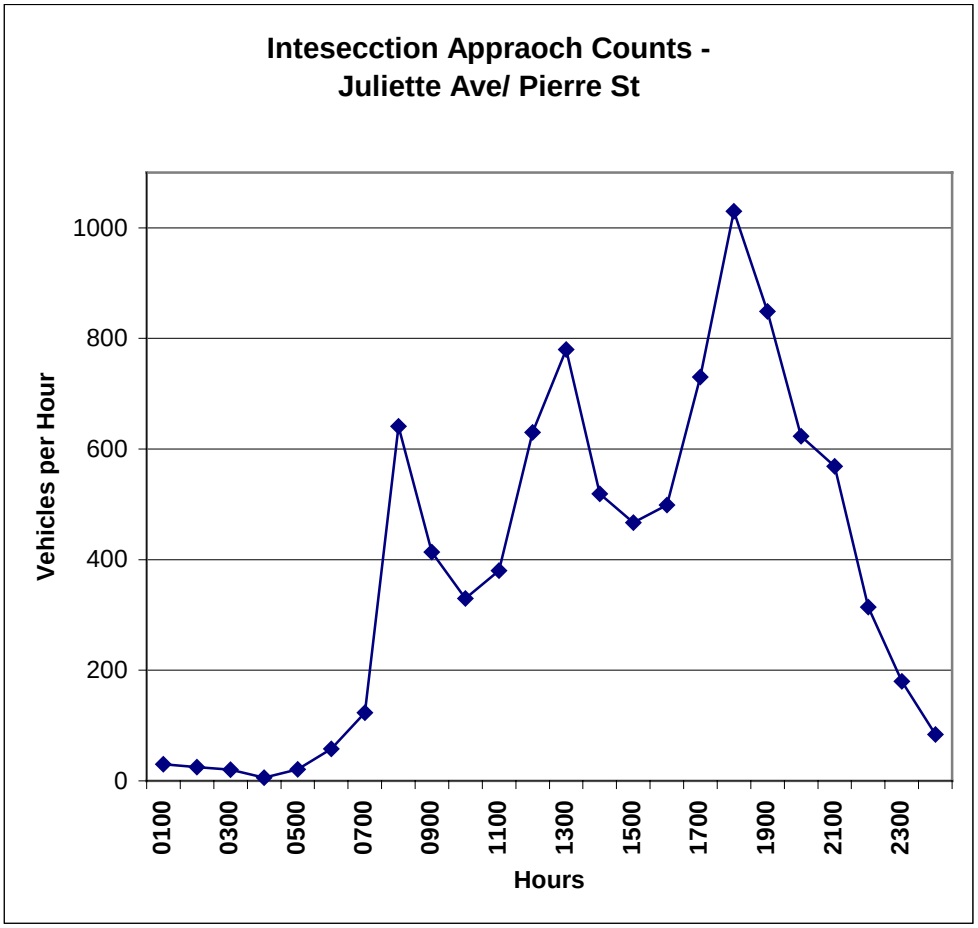

Figure 10 - Juliette Avenue/ Pierre Street – Total Approach Traffic Counts

The two intersecting streets are both two-lanes with one lane in each direction. Parking is restricted near the intersection. No specific turn lanes are marked on the street; however, during times of heavy traffic, informal turn lanes develop. The east and west approaches are STOP sign controlled while the north and south are not controlled.

The intersection is level on all approaches.

Table 11 - Juiliette Avenue/ Pierre Street 85 Percentile Appraoch Speeds

Approach	North	South	East	West
85% Speed (kph)	57	62	60	54
(mph)	35	38	37	33

Traffic volumes for this intersection for each of the study hours are shown in Table 12. An examination of the cumulative frequency histogram (see Figure 11) showed that the raw traffic count data exhibited the approximate shape of normally distributed data.

Table 12 - Juliette Avenue/ Pierre Streeet Traffic Count Data

Date:	Day of Week:	Count:	Peak Hour Factor:	Max Peak Hour:
8/28/99	Saturday	206	0.79	261
8/22/99	Sunday	236	0.89	265
8/17/99	Tuesday	242	0.85	285
8/22/99	Sunday	270	0.96	281
8/17/99	Tuesday	303	0.88	344
8/23/99	Monday	304	0.67	454
8/28/99	Saturday	305	0.88	347
8/23/99	Monday	307	0.94	327
8/17/99	Tuesday	311	0.80	389
8/25/99	Wednesday	315	0.55	573
8/25/99	Wednesday	317	0.89	356
8/22/99	Sunday	320	0.86	372
8/16/99	Monday	328	0.66	497
8/25/99	Wednesday	329	0.89	370
8/16/99	Monday	353	0.95	372
8/23/99	Monday	370	0.84	440
8/17/99	Tuesday	378	0.66	573
8/17/99	Tuesday	389	0.91	427
8/16/99	Monday	416	0.85	489
8/28/99	Saturday	426	0.87	490
8/28/99	Saturday	437	0.93	470
8/25/99	Wednesday	495	0.91	544
		328	**0.83**	**395**
Summary:				
	Max:	495	Range:	289
	Min:	206		

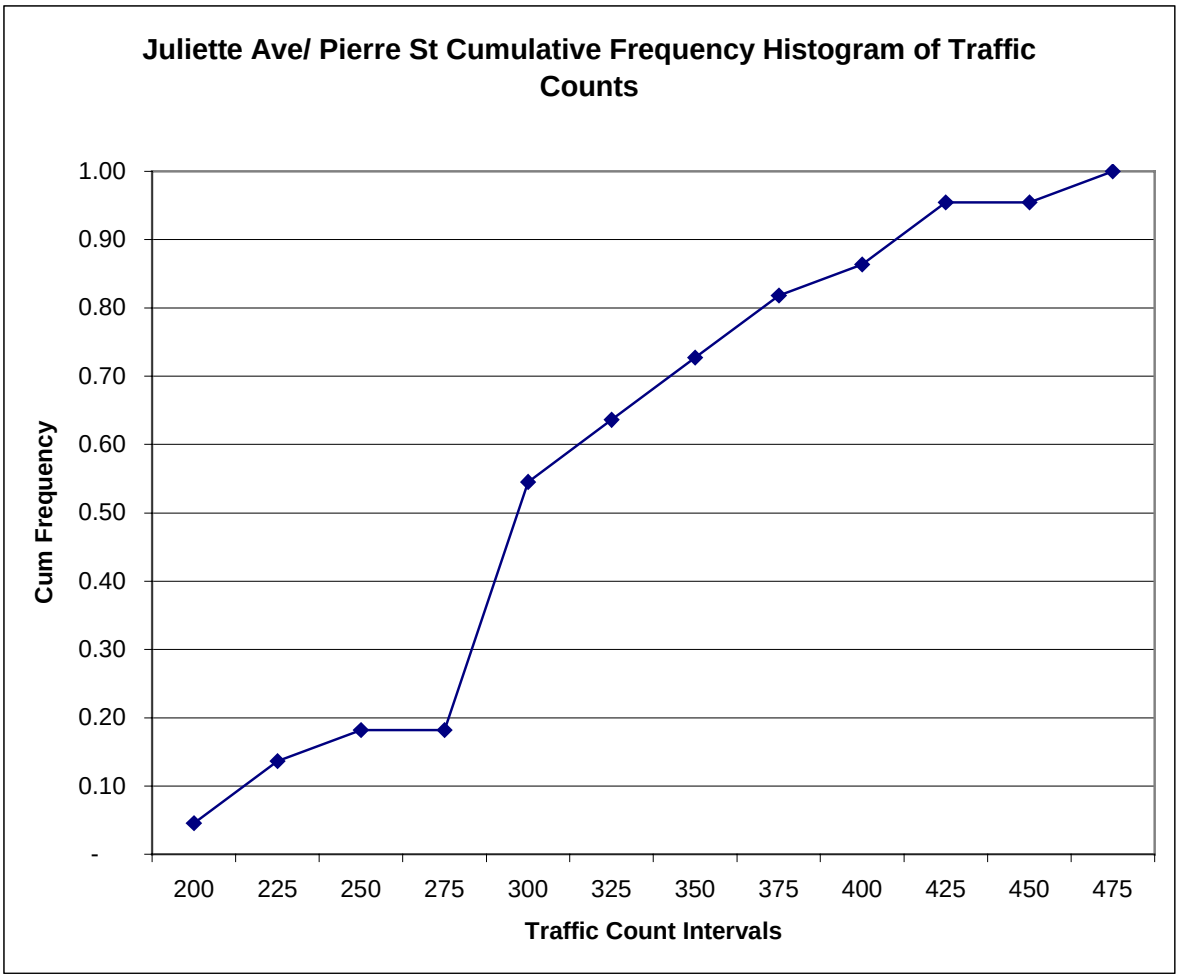

Figure 11 - Cumulative Frequency Distribution - Juliette Aveneu/ Pierre Street

Section 4.3 – Comparison of Traffic Volumes at the Three Study Intersections

Three intersections carrying three similar, but different levels of traffic were evaluated. To determine when the hourly traffic data was to be collected at each, 'study hours' were determined. At the roundabout (CG), the study hours represented times of maximum traffic flow. Maximum traffic flow was chosen as the literature indicated that the hourly traffic range carried by the Manhattan roundabout was at the low end of the scale for existing roundabouts in the United States (as shown in Figure 2). Also, using maximum traffic flow would allow examination of the roundabout under peak loading conditions. These traffic volumes ranged from 224 to 402 vph and averaged 310 vph.

The peak traffic levels carried at the two comparable intersections were much higher than those found at the roundabout. Therefore, data was collected at the two comparable intersections (DW and JP) during times when the traffic at these intersections was near the range of the roundabout traffic volumes. Referring to Figure 12, the peaks for the roundabout (CG) intersection occur near 8:00 AM and from 4:00 – 7:00 PM. To achieve similar traffic volumes as occurred at the roundabout, the Dickens Avenue/ Wreath Avenue intersection was studied in general at 7:00 AM and from 7:00 – 9:00 PM. Similarly, the Juliette Avenue/ Pierre Street

intersection was examined during the periods around 7:00 AM, 3:00 PM and after 7:00 PM. These non-peak times at the comparable STOP controlled intersection resulted in hourly traffic counts at DW that ranged from 263 to 480 vph and averaged 340 vph. At JP, the values ranged from 206 to 495 vph and averaged 238 vph. This method of selective data collection allowed the three intersections to be evaluated under comparable traffic conditions as required in the study design.

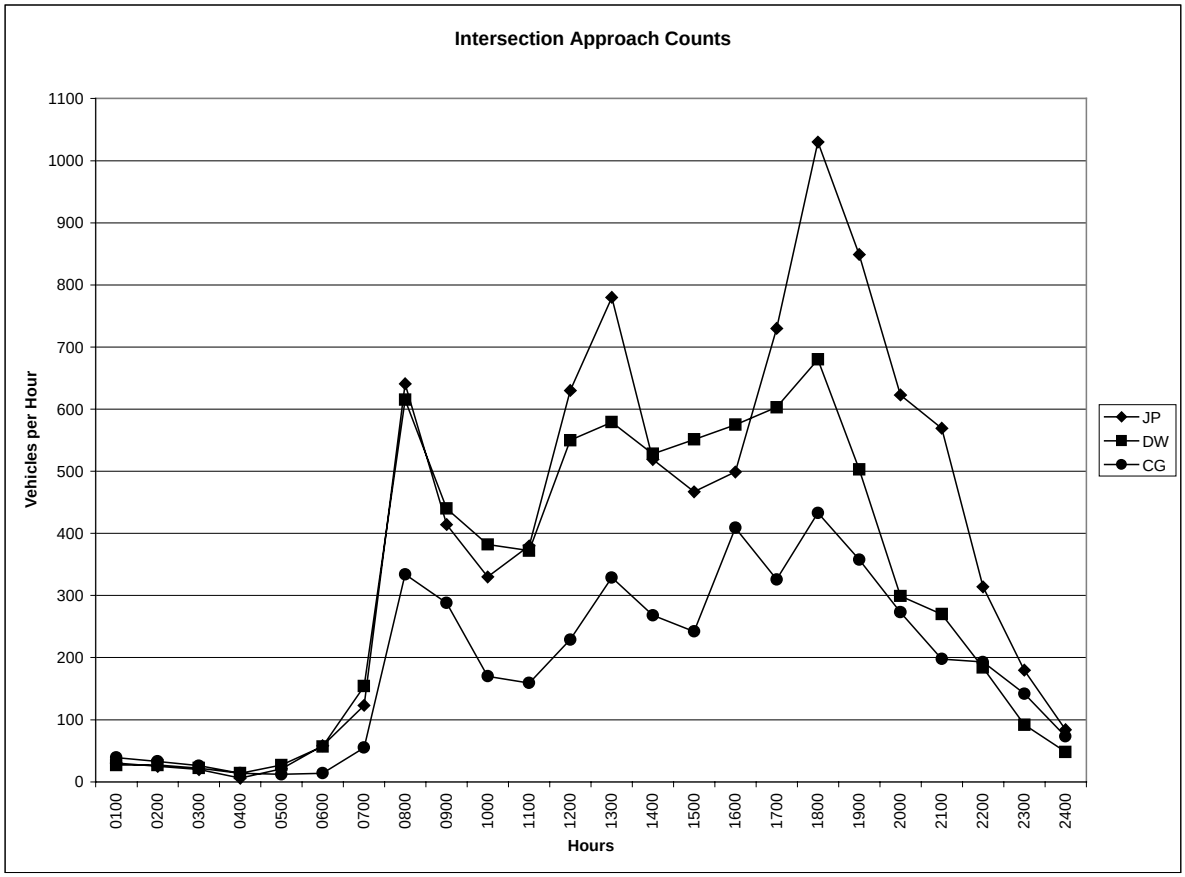

Figure 12 - Comparison of Entering Volumes at the Three Study Intersections